HAIR AND URINE COTININE AS BIOMARKERS FOR PASSIVE SMOKING IN ACUTE BRONCHIOLITIS AND THEIR CORRELATION TO CLINICAL SEVERITY SCORE

Thesis

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بسم الله الرحمن الرحيم
وَأَنْزَلَ اللهُ عَلَيْكَ
الْكِتَابَ وَالْحِكْمَةَ
وَعَلَّمَكَ مَا لَمْ
تَكُنْ تَعْلَمُ وَكَانَ
فَضْلُ اللهِ عَلَيْكَ
عَظِيمًا
صدق الله العظيم
سورة النساء آية (١١٣)

Remember

Every child has the right to grow up in a 'smoke free environment.

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Nancy Awad Mohammed Awad

List of Contents

List of Tables

List of Tables (cont...)

List of Boxes

List of Figures

List of Figures (Cont...)

List of Abbreviations

ALI	Acute lung injury.
AOM	Acute otitis media.
ARDS	Acute respiratory distress syndrome.
BPD	Bronchopulmonary dysplasia.
BC	Before Christmas.
BaP	Benzo(a)pyrene.
BR	Bronchial responsiveness.
CHD	Congenital heart disease.
CLD	Chronic lung disease.
CO2	Carbon dioxide.
CRP	C-reactive protein.
CPAP	Continuous Positive Airway Pressure.
CO	Carbon Monoxide.
COLD	Chronic obstructive lung disease.
COHg	Carboxyhaemoglobin.
CBC	Complete blood count.
C.S.	Cesarean section.
DNA	Deoxyribonucleic acid.
ETS	Environmental Tobacco Smoke.
ELISA	Enzyme linked immunosorbent assays.
ED	Emergency department.
ESR	Erythrocyte sedimentation rate.
1st	First.
4th	Forth.
5th	Fifth.
GPS	Gas phase cigarette smoke.
Hb	Haemoglobin.
HMPV	Human metapneumovirus.
hCAP	Human cathelicidin antimicrobial peptide.

List of Abbreviations (cont...)

HAI	Healthcare associated infection.
HCN	Hydrogen cyanide.
HDL	High density lipoprotein.
HS	Highly significant.
IV	Intravenous.
ICU	Intensive care unit.
LRIs	Lower respiratory infections.
LBW	Low birth weight.
LRTI	Lower respiratory tract infection.
MENA	The Middle East and North Africa.
MS	Mainstream.
mRNA	Messenger ribonucleic acid.
µg	Microgram.
nCPAP	Nasal Continuous Positive Airway Pressure.
NPV	Negative predictive value.
n	Number.
NS	Nonsignificant.
NICU	Neonatal intensive care unit.
ng/ml	Nanogram per milliliter.
O2	Oxygen.
OR	Odds ratio.
PaCo2	Arterial carbon dioxide tension.
PaO2	Arterial oxygen tension.
PICU	Pediatric Intensive Care Unit.
PAHs	Polyaromatic hydrocarbons.
PVD	Peripheral vascular disease.
PPV	Positive predictive value.
RSV	Respiratory syncytial virsus.

List of Abbreviations (cont...)

RSVIG	RSV hyperimmune globulin.
RSP	Respirable suspended particulates.
RDAI	Respiratory distress assessment instrument.
RD	Respiratory distress.
ROC	Receiver operating characteristic.
r	Correlation coefficient.
SIDS	Sudden infant death syndrome.
SS	Sidestream.
SPSS	Statistical program for social science version.
S	Significant.
S.D.	Standard deviation.
2nd	Second.
SHS	Secondhand smoke.
SaO2	Saturated oxygen.
TLR	Toll-like receptors.
TSNAs	Tobacco-specific nitrosamines.
3rd	Third.
UTI	Urinary tract infection.
URTI	Upper respiratory tract infection.
WBCs	White blood cells.

INTRODUCTION

Viral bronchiolitis is the main reason for hospitalization for respiratory tract illness in infants ***(Zorc & Hall, 2006).*** It can also cause respiratory insufficiency in approximately half the patients admitted to the PICU (Pediatric intensive care unit) with this diagnosis ***(Wang, 1995 & Torres, 2003)***.

Bronchiolitis is a disorder of the lower respiratory tract that occurs most commonly in young children and is caused by infection with seasonal viruses such as RSV (respiratory syncytial virus) ***(Hall et al., 2009)***. More than one third of children develop bronchiolitis during the first 2 years of life ***(Zorc & Hall, 2006; Yorita et al., 2008)***.

Clinical assessment for the severity of bronchiolitis can be done by a RDAI (respiratory distress assessment instrument) score which is based on wheezing & chest retractions ***(Brasi et al., 2010)***.

Tobacco smoke is the most common and important indoor environmental pollutants to which children are exposed. The effect of tobacco smoke exposure was found to be more prominent in infants. It is now clear that passive smoking of children is associated with a higher rate of respiratory problems like asthma, bronchitis, pneumonia, bronchiolitis as well as

chronic otitis media and sudden infant death ***(Gurkan et al., 2000)***.

Passive smoking increases the incidence of respiratory infections and bronchial hyper-responsiveness. Sudden heavy cigarette smoke exposure may predispose to an acute respiratory infection. Thus; it may be hypothesized that passive smoking may influence the development of RSV bronchiolitis ***(Gurkan et al., 2000)***.

Hair analysis for nicotine and its metabolite cotinine can be used as a biological marker for exposure to smoking in infants and children. During the last two decades, hair analysis emerged as an objective biological marker for cumulative and temporal account of exposure to cigarette smoking ***(Tepper et al., 2005)***.

Urine cotinine can be used as a biomarker for children exposed to passive smoking ***(Krzywiecka et al., 2006)***.

Cotinine, a product of the metabolism of nicotine, is measurable in urine and, correlates strictly and directly to environmental tobacco smoke (ETS) exposure; therefore representing a well-known internal dose marker ***(Bono et al., 2005)***. Evaluation of cotinine concentration in urine allows distinguishing the passive from the active tobacco smokers ***(Wiergowski et al., 2006)***.